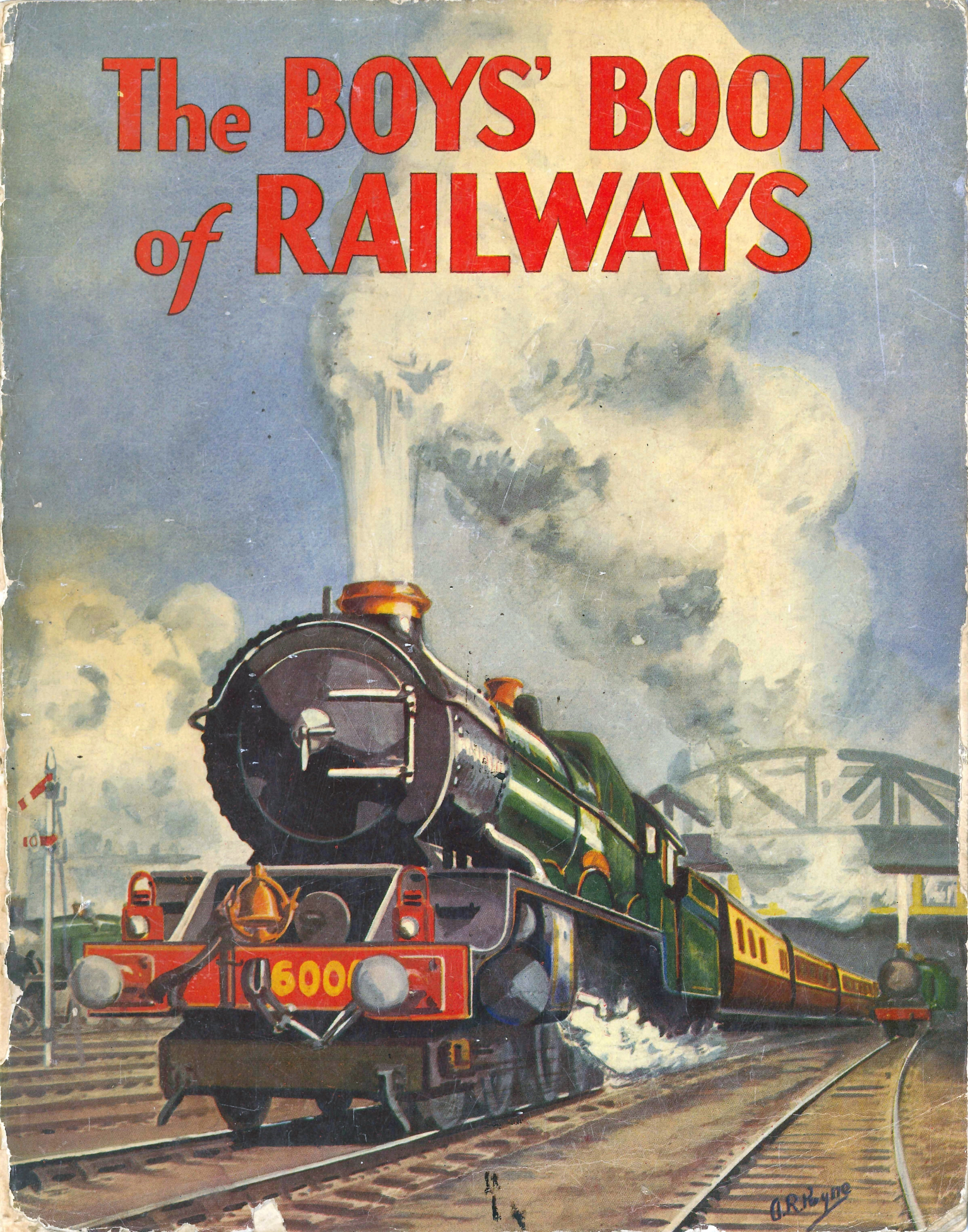
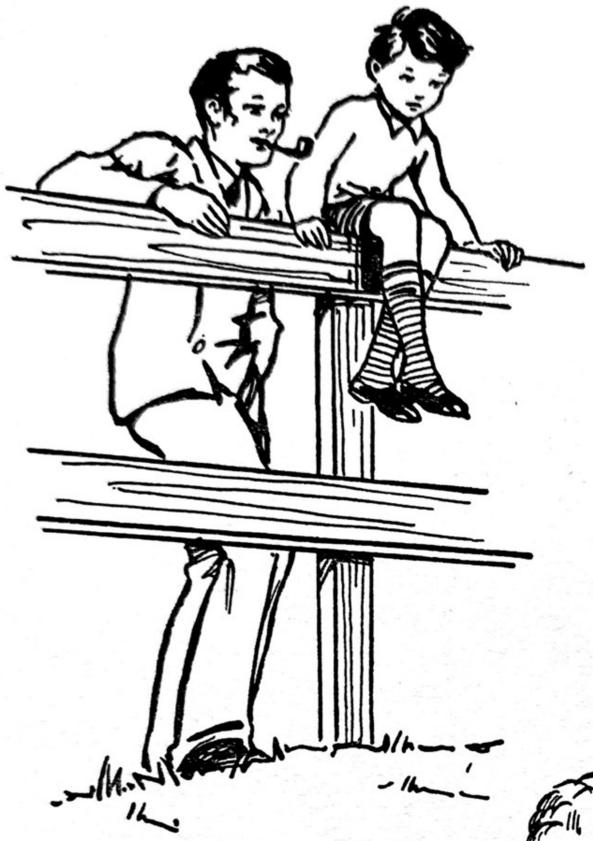
The BOYS' BOOK of RAILWAYS



The Boys' Book of Railways

Rhaetian Railways Switzerland.

Engadine Express ascending Allurla Valley Spirals.



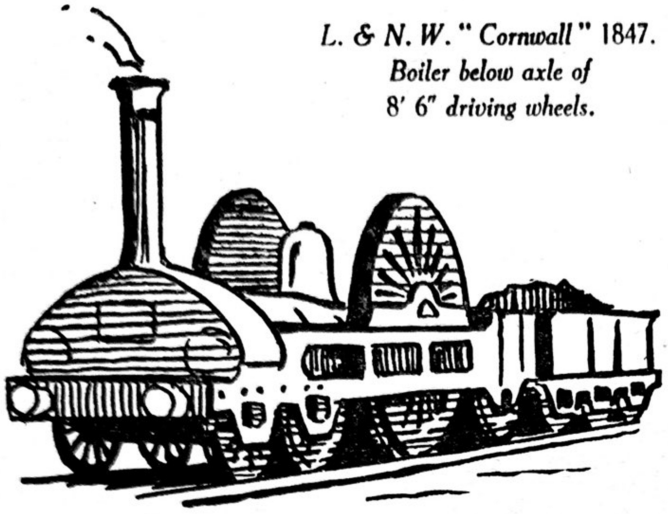
DICK WALLACE, like many boys, was very interested in railways. One day Mr. Wallace took Dick to watch the famous " Cheltenham Flyer " pass on her way to Paddington.

" Well, Dick ", said his father, when they arrived at the track-side, " its a few minutes before the ' Flyer ' is due, so let's talk about railways, shall we ? ".

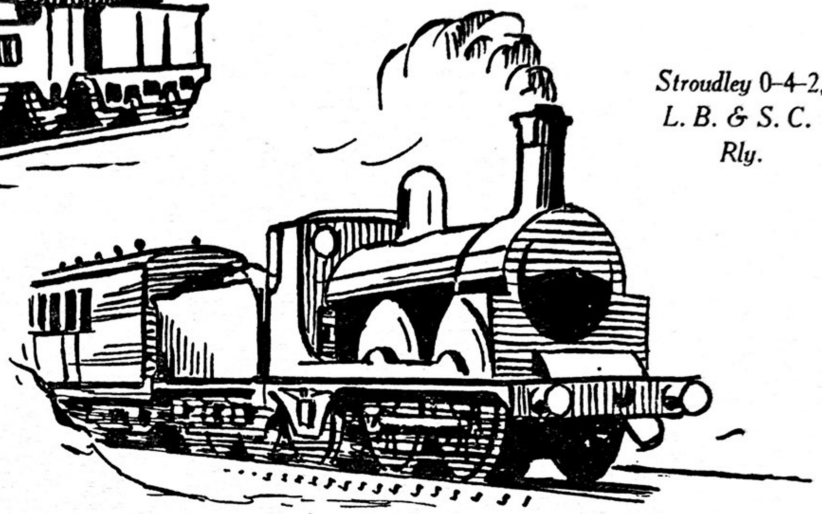
" Rather, Dad ", answered Dick. " Tell me how they started ".

" Righto. The first public railway was the Stockton and Darlington, but before that there were a number of private colliery lines, which had used steam engines for a few years. Actually, rails were first used about 1600, when horses hauled wagon-loads of coal from the pits to the ' staithes ', as the shiploading berths were called. These railways were made of wood, but later on iron took the place of wood, and then steel which is now used

The " Cheltenham Flyer."



L. & N. W. "Cornwall" 1847.
Boiler below axle of
8' 6" driving wheels.



Stroudley 0-4-2,
L. B. & S. C.
Rly.

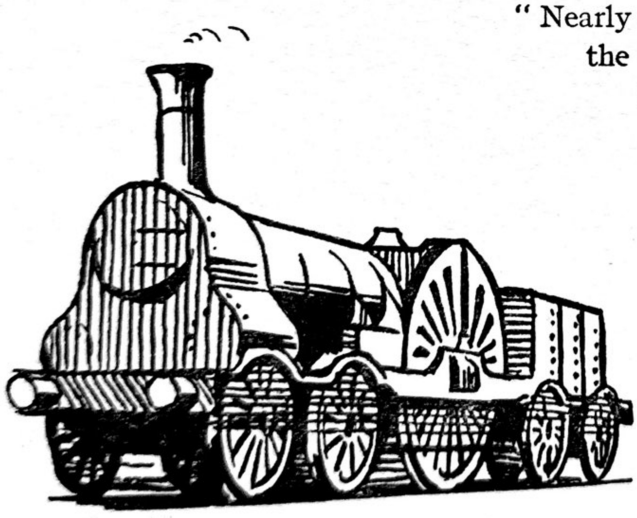
everywhere. One of the most famous of the early engines was the 'Puffing Billy' used by the Wylam Colliery".

"Just a tick, Dad", interrupted Dick. "The 'Cheltenham Flyer' is signalled".

"So she is, Dick. Look! here she comes!"

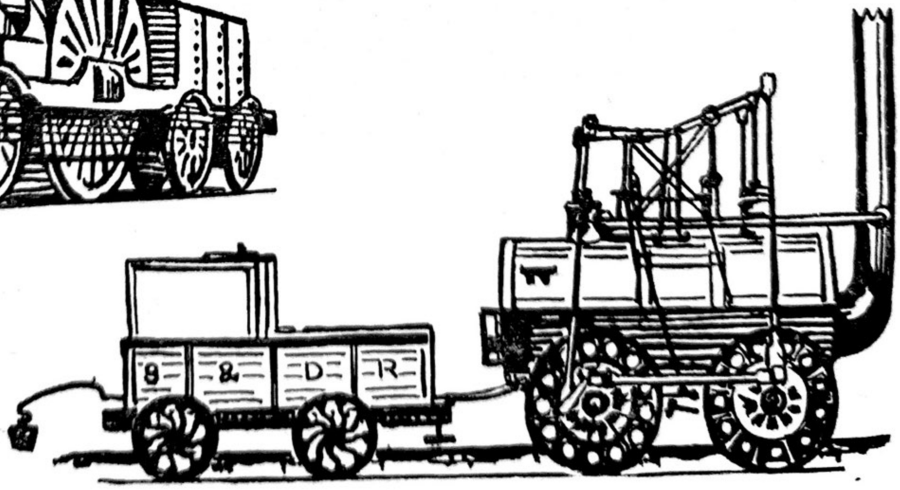
"How fast do you think she is going?" asked Dick.

"Nearly ninety miles per hour, I expect, because for the 77¼ miles from Swindon to Paddington she has to average 71 m.p.h., maintaining between 80 and 85 for long distances", answered Mr. Wallace.



4-2-4-T of 1853.
Bristol & Exeter Railways.

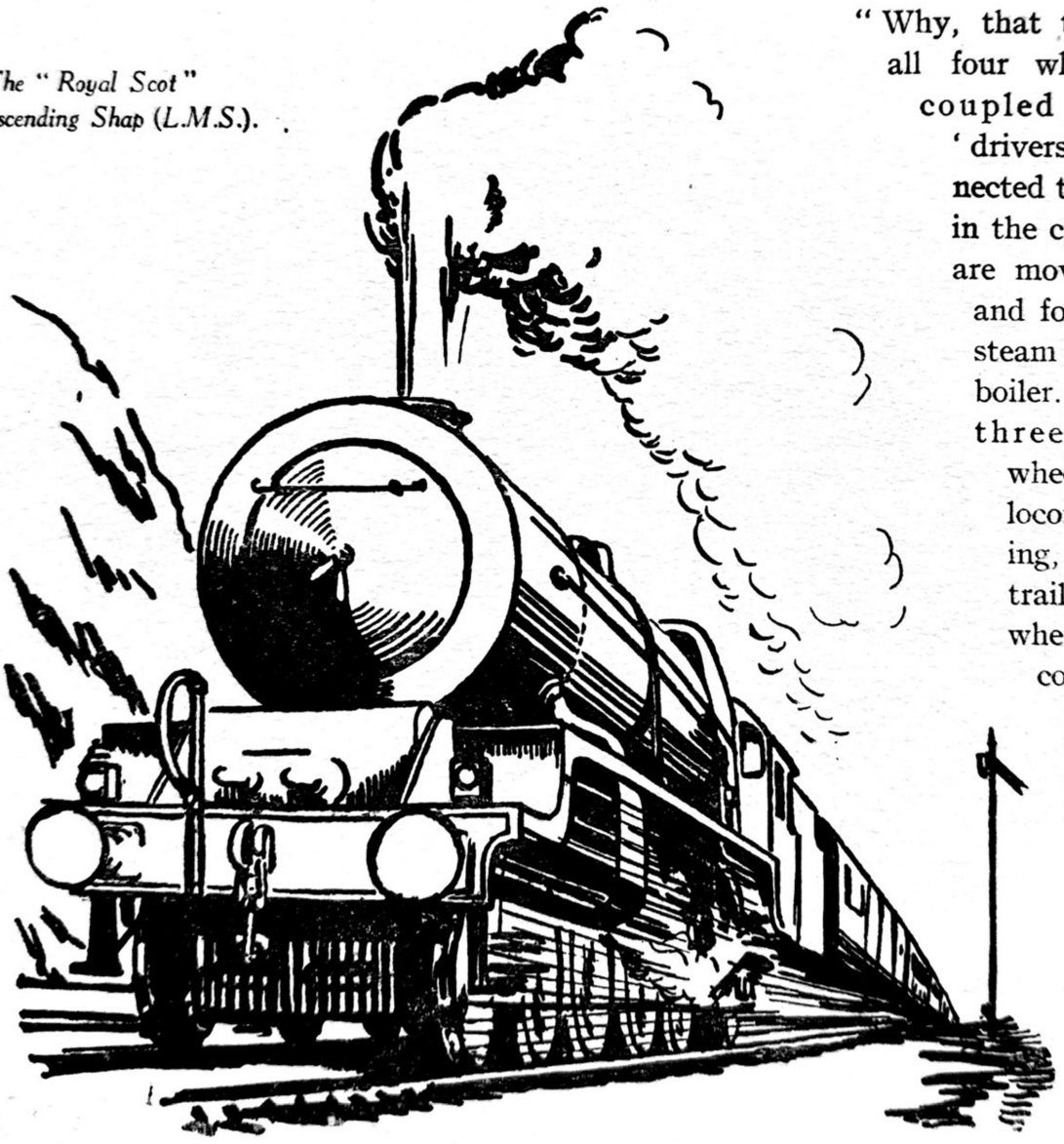
"*Locomotion*" *S. & D. Rly.*



" I do wish I could go on it ", sighed Dick. " The fastest train in the world ! But please go on about the early railways ".

" As I said just now, the ' Stockton and Darlington ' was the first public railroad and was built in 1825 by George Stephenson. It was intended for coal traffic originally, but passenger-carrying services were successfully started. ' Locomotion ' was the name of the first engine, a 0-4-0 designed by George Stephenson and built by Robert Stephenson at the works founded by his father. As soon as it was seen that the Stockton and Darlington was a success, railways were projected all over Britain. The Liverpool and Manchester, a short line in Scotland, and the Canterbury and Whitstable were the next to be built, all by George Stephenson, who is truly known as the ' father of the railway ' ".

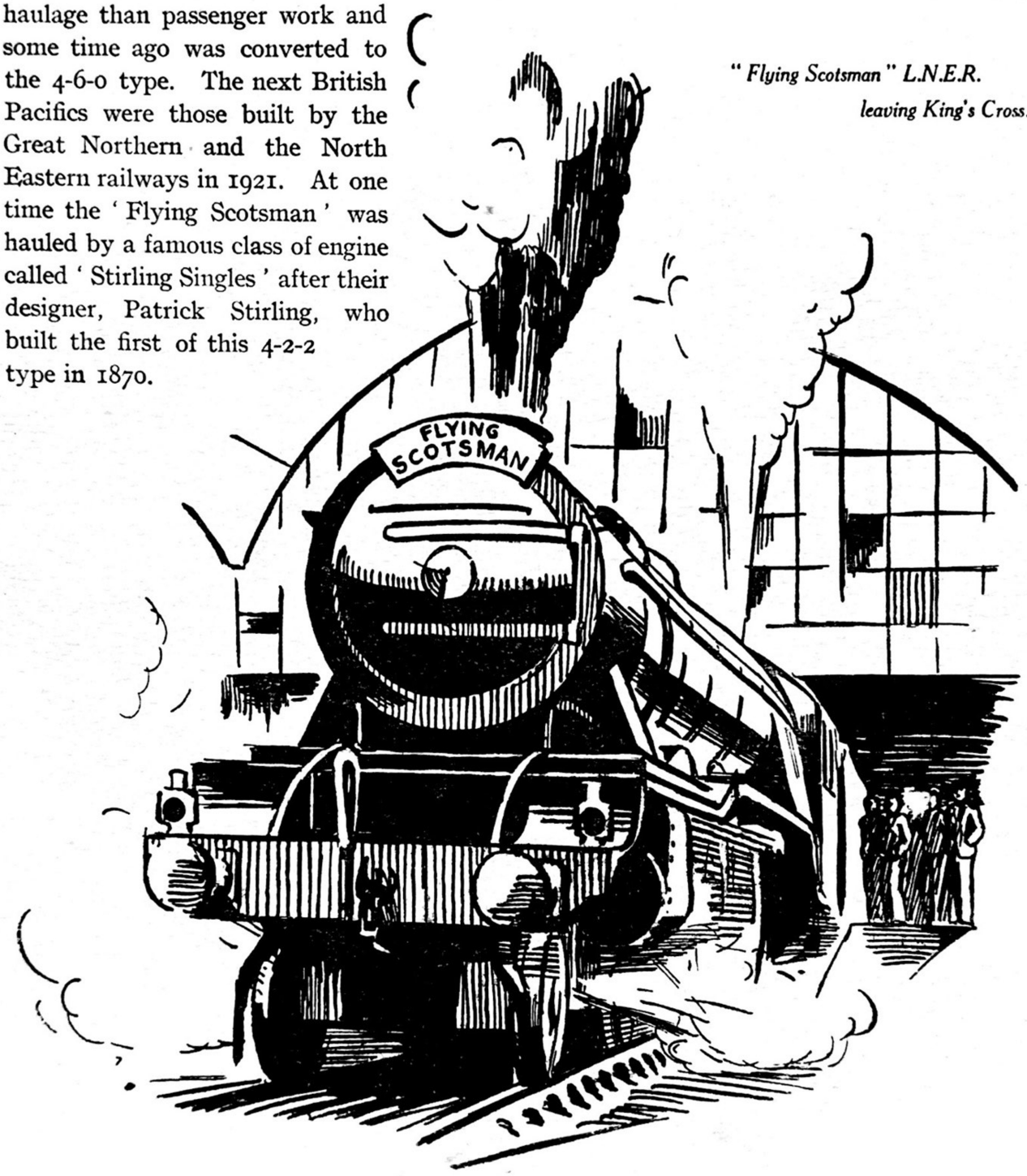
" Please, Dad, what does ' 0-4-0 ' mean ? "



The " Royal Scot " ascending Shap (L.M.S.).

" Why, that the engine has all four wheels coupled ; coupled wheels or ' drivers ' are connected to the ' pistons ' in the cylinders, which are moved backwards and forwards by the steam from the boiler. There are three kinds of wheels used by locomotives : leading, driving, and trailing, the tender wheels not being counted. The engine of the ' Cheltenham Flyer ' was a 4-6-0 which means she has first a four-wheeled leading bogie, and then six

coupled wheels, but no trailing wheels. When we see the ' Flying Scotsman ', you will find she has a pair of trailing wheels behind the six ' drivers ', so she is a 4-6-2. This is called the ' Pacific ' type. The first Pacific built in Britain was a solitary engine constructed by the Great Western Railway in 1908. She was more successful on heavy freight haulage than passenger work and some time ago was converted to the 4-6-0 type. The next British Pacifics were those built by the Great Northern and the North Eastern railways in 1921. At one time the ' Flying Scotsman ' was hauled by a famous class of engine called ' Stirling Singles ' after their designer, Patrick Stirling, who built the first of this 4-2-2 type in 1870.



" Flying Scotsman " L.N.E.R. leaving King's Cross.

London's Underground.

" In some overseas countries you will find enormous engines with wheel arrangements like 2-10-10-2 and 2-8-8-4, which means they have two sets of driving wheels between the leading and trailing wheels. ' Garrett ' type engines have two complete sets of wheels, widely spaced to permit of a very big boiler being carried. They look rather like two peculiar engines, back to back, sharing one boiler.

" With ' tank ' engines, where the coal and water are carried on the main chassis, on frames, all the wheels must be counted.

" An engine built in 1847 for the London and North Western Railway had driving-wheels 8 feet 6 inches in diameter. This engine, named ' Cornwall ' was of the 4-2-2 type, that is only one pair of driving wheels, and had the boiler below the axle of the driving wheels. But ' Cornwall's ' driving wheels, though big, were beaten a few years later by some 4-2-4 tank engines on the Bristol and Exeter Railway, which had drivers of the amazing diameter of 9 feet ! "

Dick was even more interested in railways than before from what his father had told him, and asked it he could be taken to London to see some more famous trains.

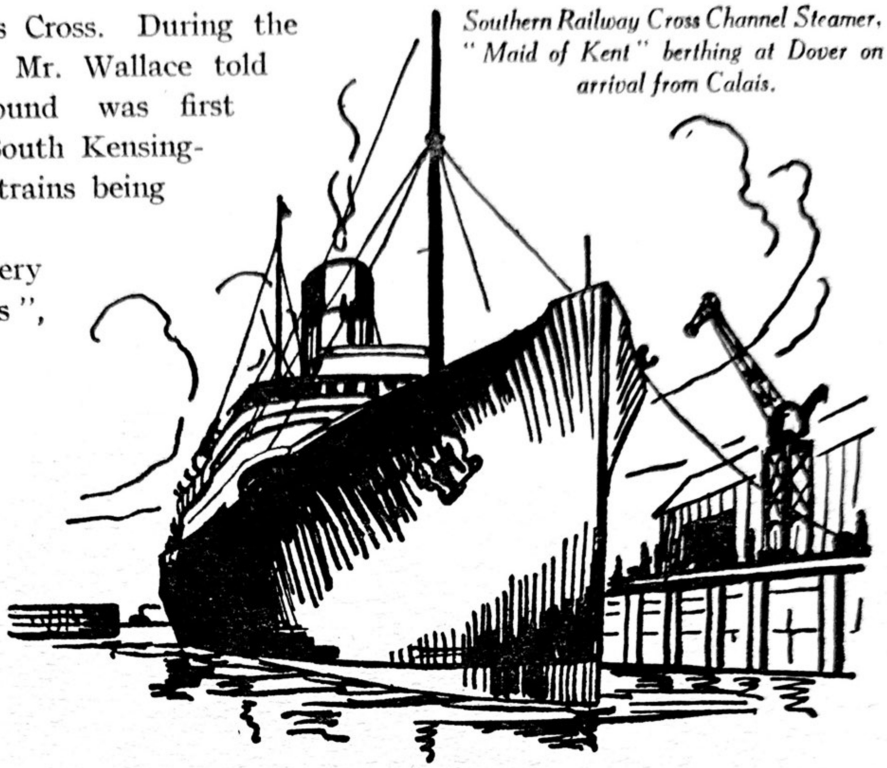
So next day Dick and Mr. Wallace travelled to Paddington, and proceeded by

Liverpool Overhead Railway.

"Underground" to King's Cross. During the latter part of the journey Mr. Wallace told Dick how the Underground was first opened, in 1868, between South Kensington and Westminster, the trains being hauled by steam-engines.

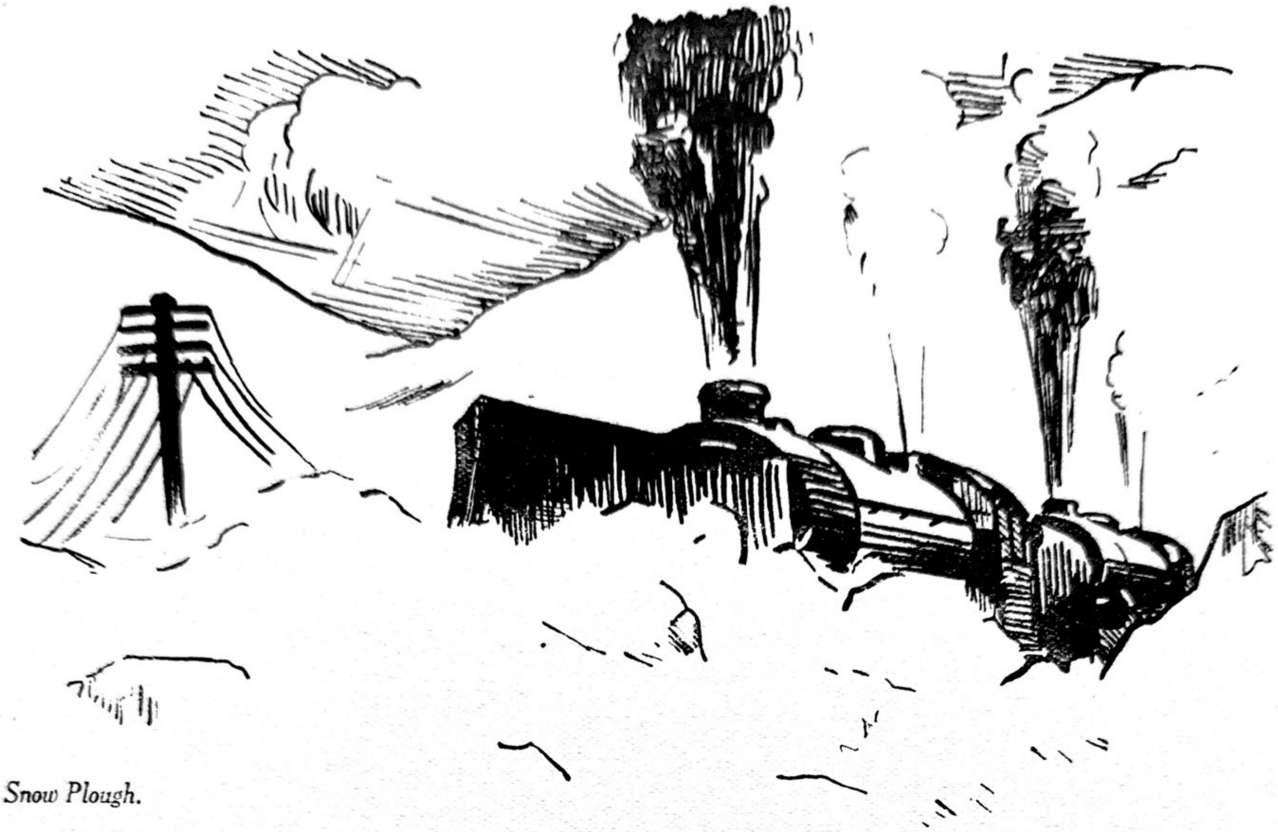
"It must have been very smoky in these tunnels", said Dick.

"You're right, old chap, it was. However in 1890 the first 'tube' railway was built, and this was electrically operated. Soon afterwards the Underground, which had considerably extended,



Southern Railway Cross Channel Steamer, "Maid of Kent" berthing at Dover on arrival from Calais.

Southern Railway "Golden Arrow" Continental Pullman train leaving Dover.



Snow Plough.

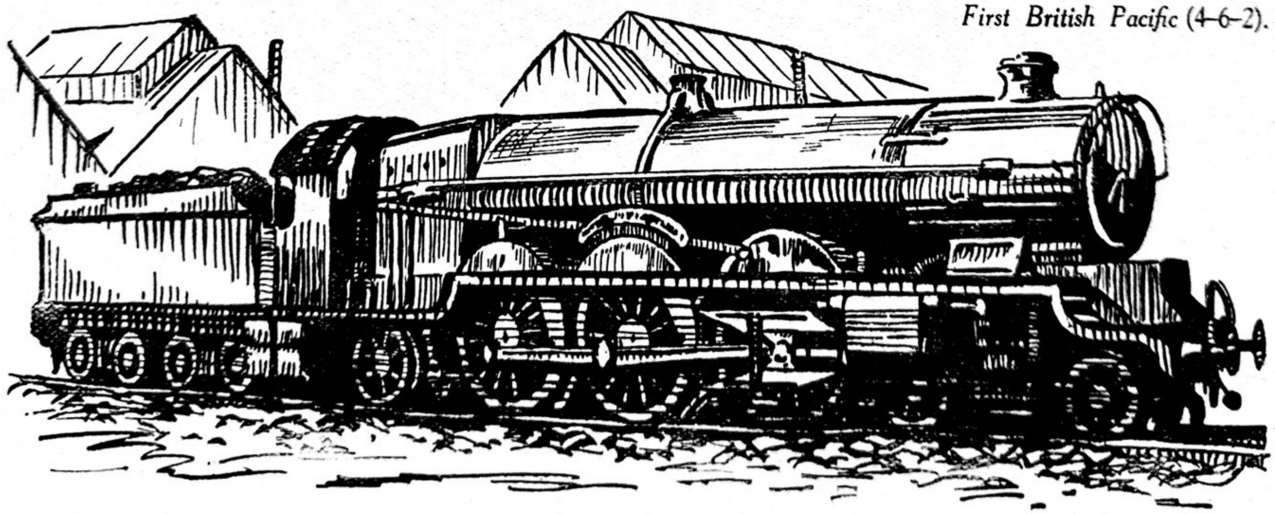
was converted from steam to electric traction ".

" What is the difference between ' tube ' and ' underground ' railways ? "

" ' Tubes ' tunnels are very deep, but the ' Underground ' is only just below the surface ", answered Mr. Wallace.

" In some places overhead railways are used. Britain's best-known is the Liverpool Overhead Railway, which runs beside the River Mersey, giving a very good passenger service to all the docks for which Liverpool is famous. Berlin and New York are two

G.W.R. " Great Bear," 1908.
First British Pacific (4–6–2).



other places where the ' overhead ' system is in use. The Ballybunion Railway in Ireland has a single rail raised on trestles with the engines and coaches double and suspended on either side. Hallo ! King's Cross ! Out we get ".

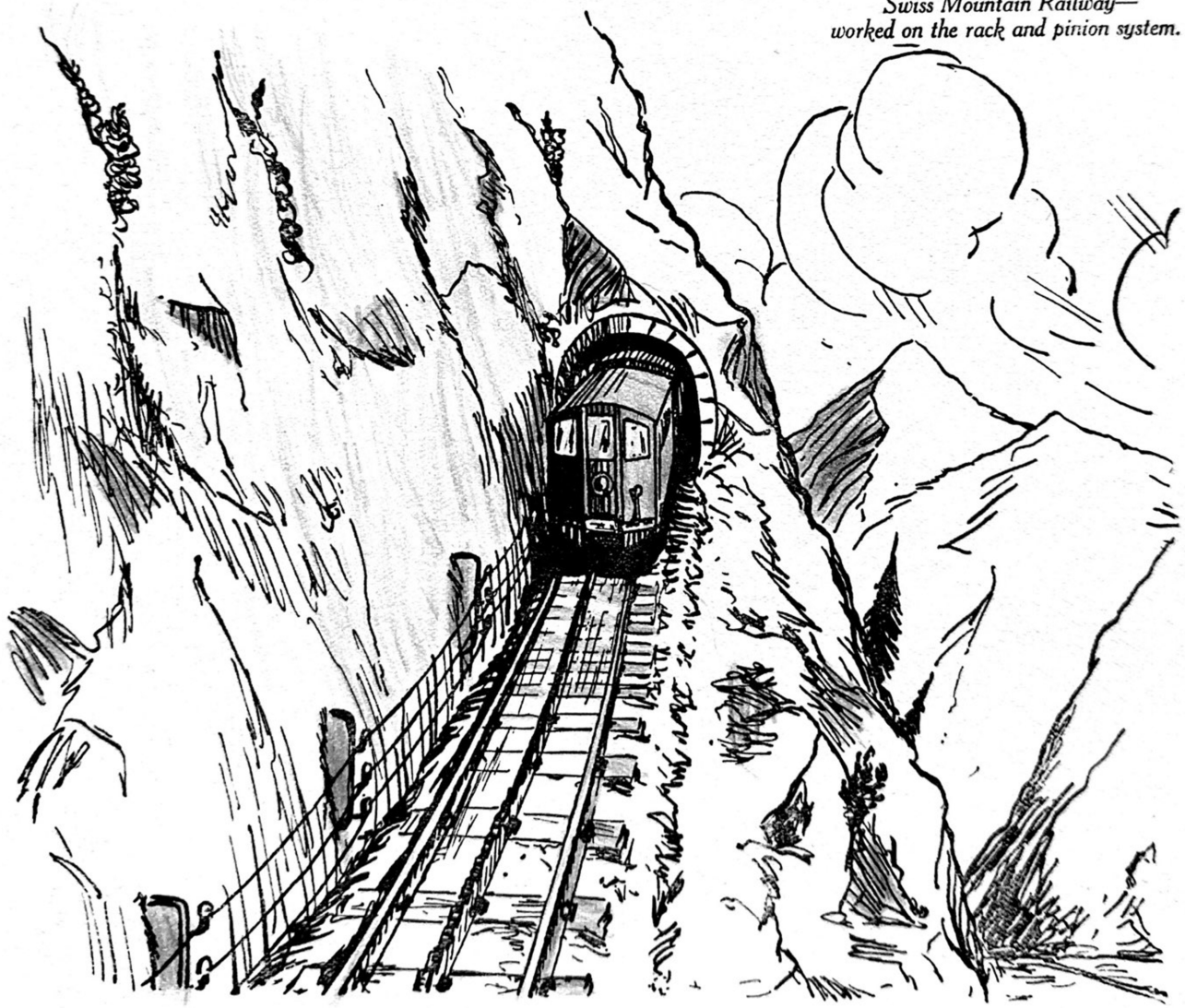
" How long does it take to get to Scotland ? " Dick asked as they walked through the station to the platform where the " Flying Scotsman " was waiting for its engine to back on.

" Seven hours and forty minutes to Edinburgh, but much longer to the extreme north of Scotland ", replied Mr. Wallace.

As they walked along beside the train, Mr. Wallace wrote down the weights which are shown on the end of each coach.

" Thirteen coaches, weighing 390 tons ", he said, " passengers and baggage another twenty, and the engine and tender weighing 159 tons, total 569 tons to be hauled without a stop to the Waverley Station in Edinburgh, 393 miles away. That is the longest regular non-stop run in the world. It is too long for one engine-driver and fireman, so they are changed half-way by means of a corridor through the tender.

Swiss Mountain Railway—
worked on the rack and pinion system.



" Here's the engine backing down now, number 2571, ' Humorist ', one of the latest of the class. These Pacifics are very fine engines and have often hauled trains over 600 tons.

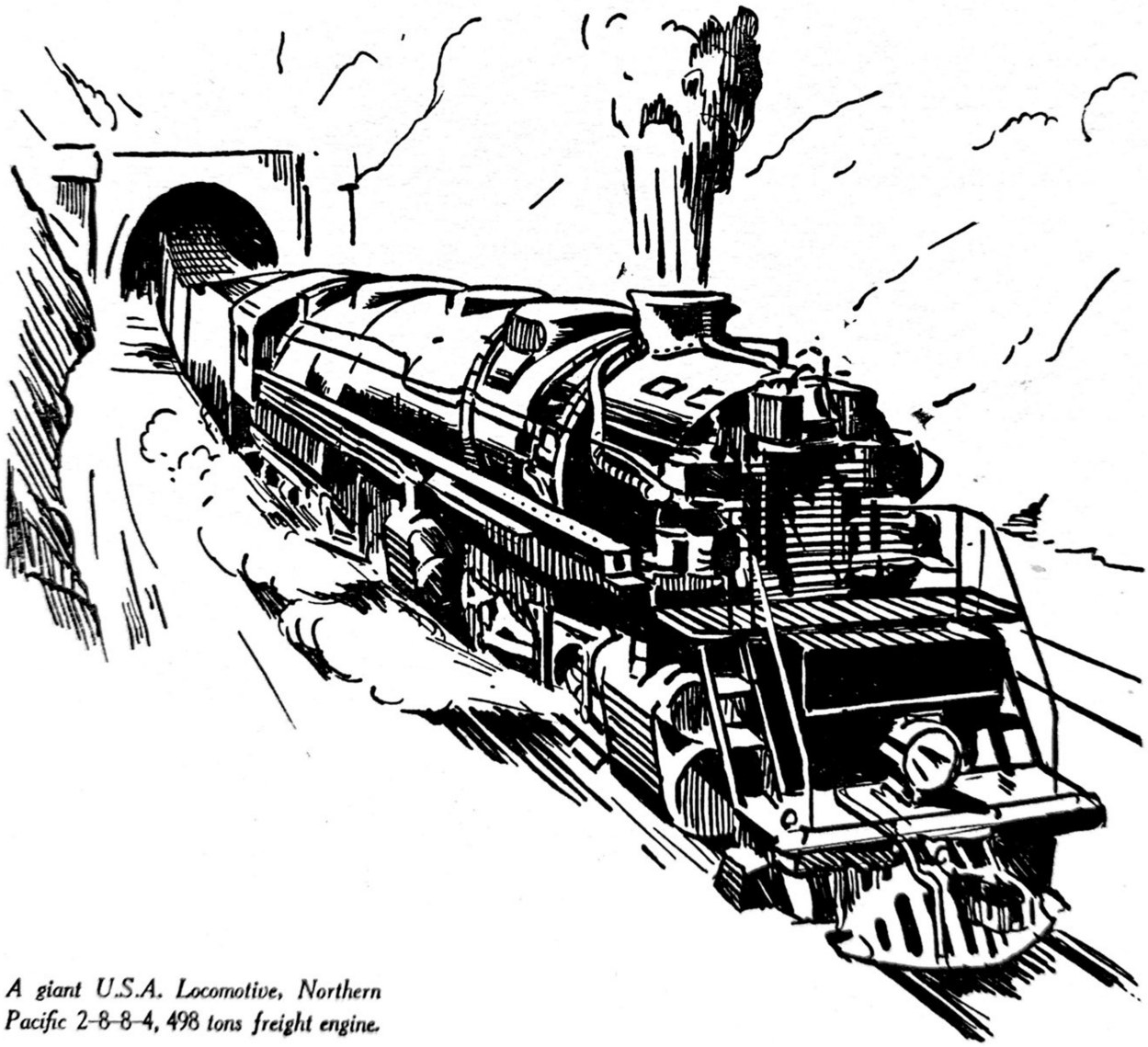
" Before 1923 there were 30 or more railway companies in Great Britain, but in that year most of them were amalgamated into four groups. This station belonged to the Great Northern Railway and the ' Flying Scotsman ' then used the metals of two more lines, the North Eastern and the North British, in its journey to Edinburgh. These three companies, with the Great Eastern, Great Central, Great North of Scotland and one or two smaller lines made up the present London and North Eastern Railway.

" One minute to ten. Look ! there's her signal . . . . and there's the guard's whistle. She's off ! 10 o'clock to the tick ! " Slowly the giant green engine gathered speed, but by the time the last coach passed Dick and his father, the train was going quite fast, and vanished into the grimy tunnel a short distance beyond the platform-ends.

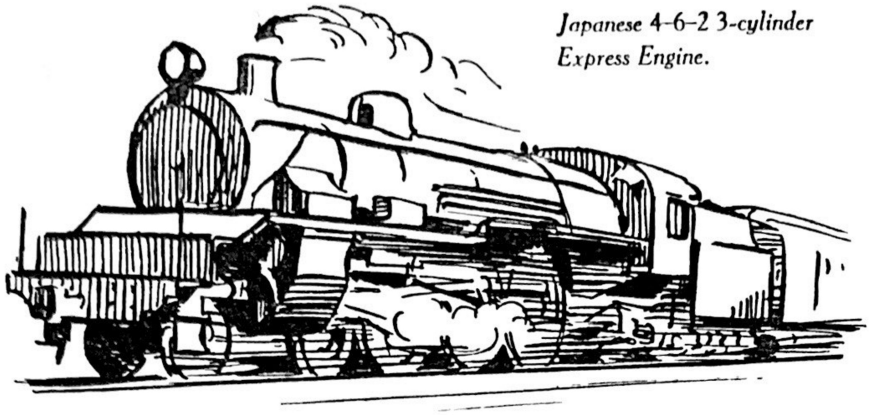
Canadian Pacific, 2–10–4.

" Well, Dick, as both the L.M.S. ' Royal Scot ' and the L.N.E.R. ' Flying Scotsman ' leave at 10 a.m., we must wait until this evening to see the up ' Royal Scot ' arrive at Euston. This leaves Edinburgh at the same time as the down train leaves London. It is always ' up ' to London whatever part of Britain the train comes from. The ' Royal Scot ' has a harder journey than the ' Flying Scotsman ', because on the way the engine has to haul her 420, or more, ton train over Shap, 915 feet high, and then, a bit farther on, over Beattock Summit, 1,015 feet above sea level. The train is divided at Symington, one portion going to Edinburgh and the other to Glasgow, each arriving 7¾ hours after leaving Euston.

" The London, Midland and Scottish Railway is the biggest of the four groups about which I was telling you just now, with over 7,000 miles of line. The ' Royal Scot ' goes first over the old London and North Western and then the Caledonian, the other companies



A giant U.S.A. Locomotive, Northern Pacific 2-8-8-4, 498 tons freight engine.



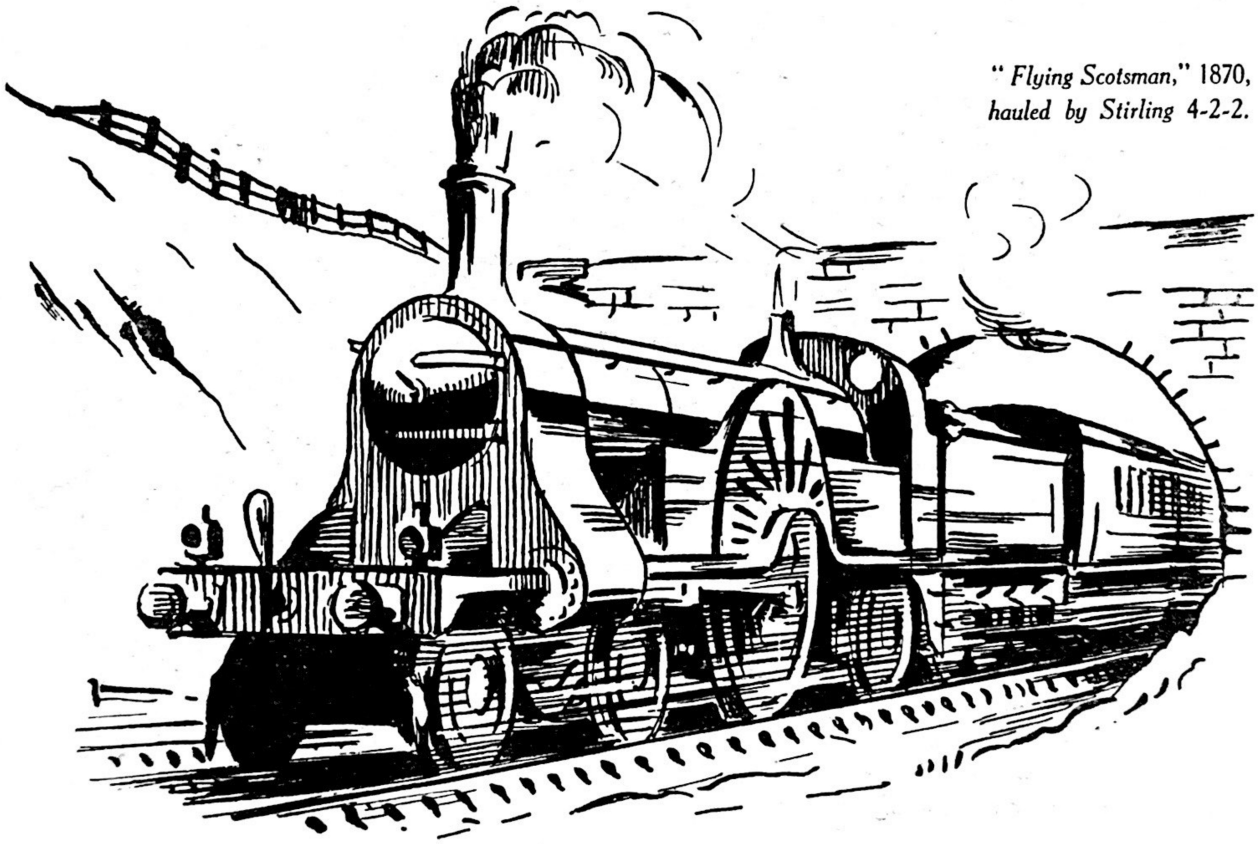
Japanese 4-6-2 3-cylinder Express Engine.

being the Midland, Glasgow and South Western, Lancashire and Yorkshire, Furness, Highland, and North Staffordshire railways."

In the afternoon Mr. Wallace took Dick to Victoria, the terminus of both the London-Brighton and South-coast, and one section of the South Eastern and Chatham Railways, which were amalgamated in 1923, with the London and South Western, to make the Southern Railway. At one of the platforms Dick and his father found the "Southern Belle" Pullman filling up with passengers.

"Why, it's electric!" exclaimed Dick.

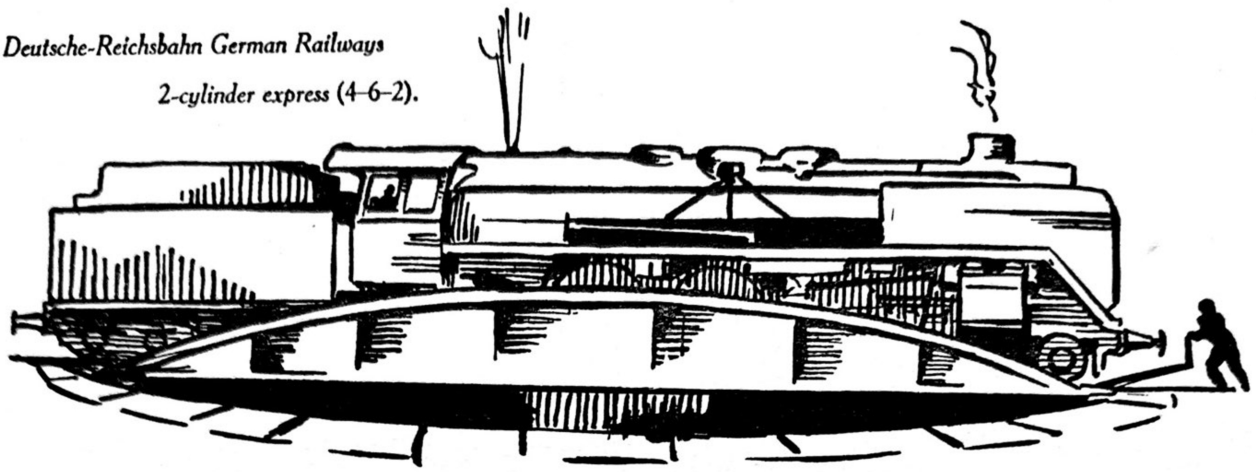
"Yes", answered Mr. Wallace, "the Southern is the largest user of electric traction in the four groups, and since the electric suburban services were so successful, they decided to electrify the main line to Brighton. On the 1st of January, 1933, the first through



"Flying Scotsman," 1870, hauled by Stirling 4-2-2.

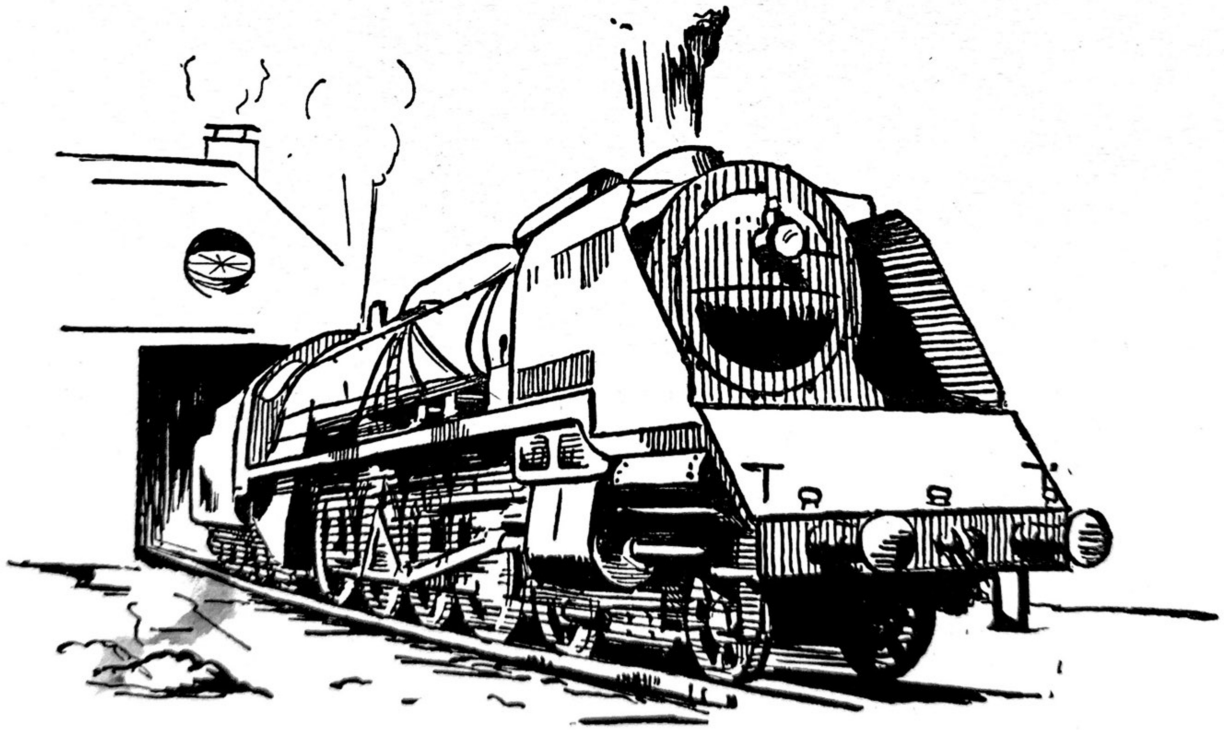
Deutsche-Reichsbahn German Railways

2-cylinder express (4–6–2).



has had some very bad country through which to run his track and the outstanding features are the wonderful spiral tunnels. In several places, on emerging from one of these tunnels, passengers can look down and see, far below, the line over which they passed, perhaps, nearly an hour earlier! Electric traction is also used to a certain extent in the United States, France, Spain, Holland, Austria, India, New Zealand and Java, among other countries."

Just before 4 o'clock Dick and Mr. Wallace went to another platform where the "Golden Arrow" Continental Pullman was due to arrive at 4 o'clock; which she did, right on the stroke. The train was hauled by No. 850 "Lord Nelson", the first of the most powerful class used on the Southern.

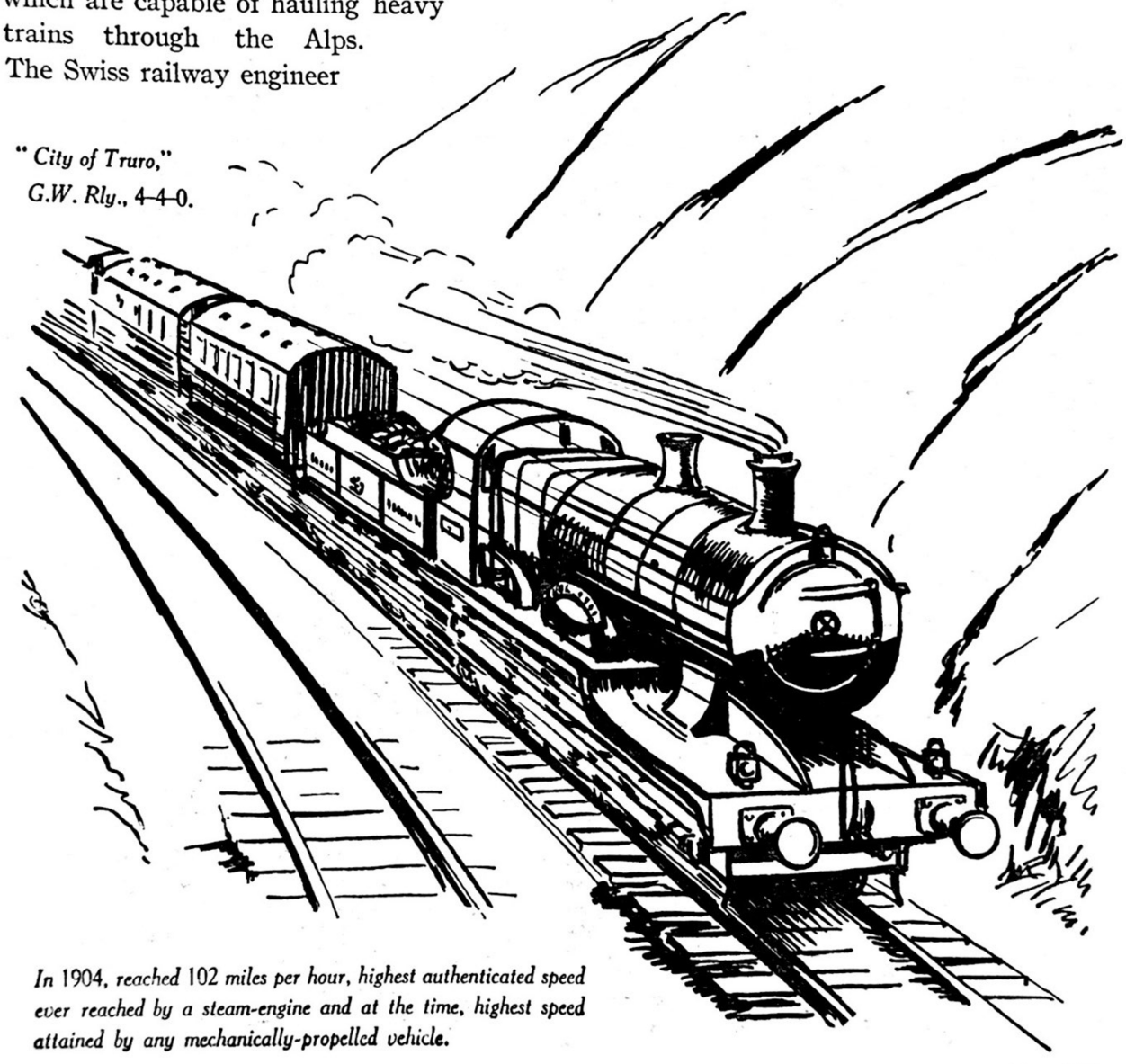


electric express left Victoria for Brighton and Worthing. As you see there isn't a separate electric engine, but motors are fitted to several coaches, units with driving compartments being placed at each end of the train. By this method extra motor-coach units can be used when longer, and therefore, heavier, trains are needed. These Pullman electric coaches are the heaviest passenger vehicles in the British Isles, weighing 62 tons each.

"It is 51 miles to Brighton, and every hour, from 9 a.m. onwards, a train leaves Victoria which does the journey in 60 minutes. Besides this there are many more trains not quite so fast.

"Abroad, in Switzerland, for instance, where numerous waterfalls enable electricity to be generated very cheaply, electric traction is used to a far greater extent than steam haulage. On most Swiss railways separate very powerful electric locomotives are in use, which are capable of hauling heavy trains through the Alps.

The Swiss railway engineer



"City of Truro," G.W. Rly., 4-4-0.

In 1904, reached 102 miles per hour, highest authenticated speed ever reached by a steam-engine and at the time, highest speed attained by any mechanically-propelled vehicle.

" What a strange language that man is talking ", said Dick. " What is it ? "

" Italian ", answered his father. " You see, this is what is called a boat-train, which means that the passengers are either foreigners visiting Britain or Britons returning from abroad. All the four groups have fleets of cross-channel steamers, in connection with which boat-trains are run ".

After this, they retraced their way northward, this time to Euston, where they watched the arrival of the " Royal Scot " at 5.45 p.m. after her long journey, 401 miles for the Glasgow section, and but a few less for that from Edinburgh.

Then home, where Dick, still thirsting for information, wanted to be told about some railways abroad.

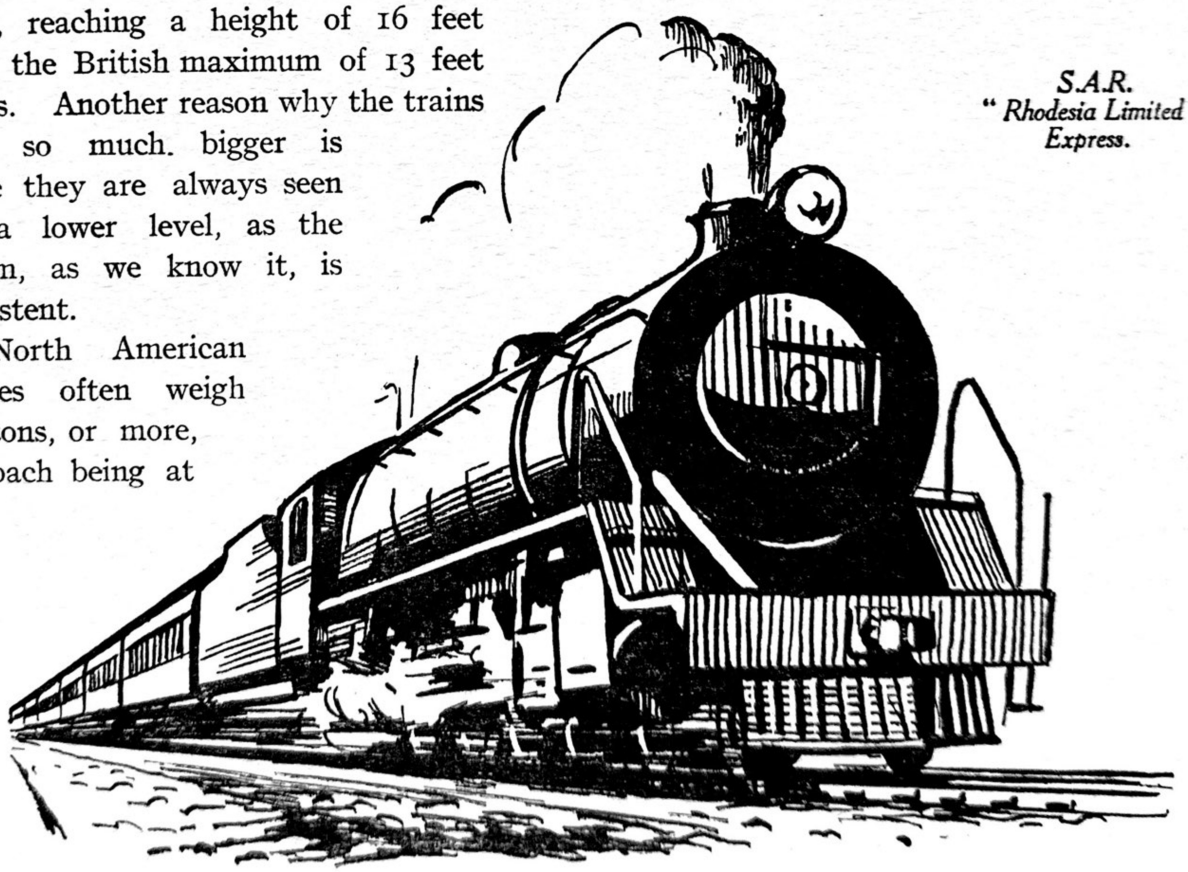
Mr Wallace being willing, asked, " Where shall we go first ? "

" America ", answered Dick promptly.

" In Canada ", said Mr. Wallace, " there are two great systems, both extending from one side of the Dominion to the other. One, the Canadian National, is the largest railway in the world, having about 22,700 miles of track. The other company, the Canadian Pacific, is not content with having a trans-continental railway, but also operates great liners across both the Pacific and the North Atlantic, making it the biggest travel system in existence.

" North American engines and rolling-stock are very much bigger than those in Britain, reaching a height of 16 feet against the British maximum of 13 feet 6 inches. Another reason why the trains appear so much. bigger is because they are always seen from a lower level, as the platform, as we know it, is non-existent.

" North American expresses often weigh 1,000 tons, or more, each coach being at



S.A.R.
" Rhodesia Limited "
Express.

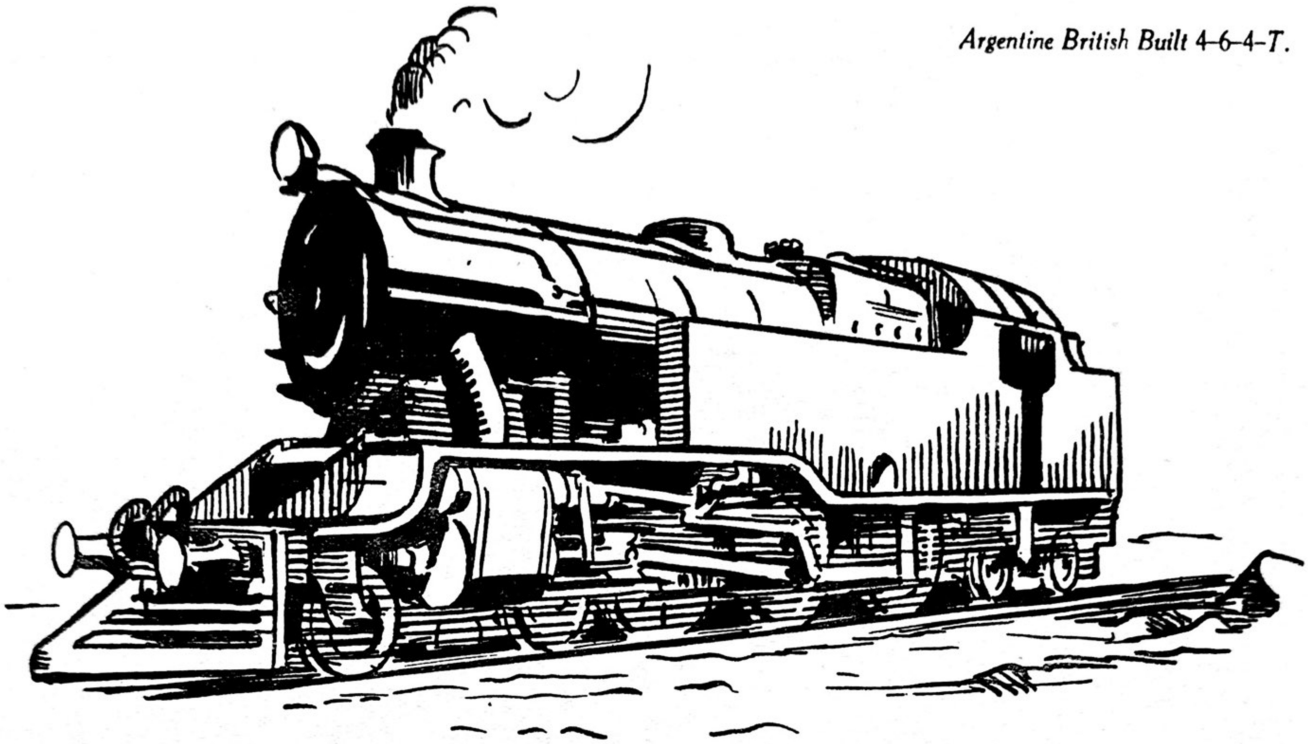
The last Steam Express to leave Victoria for Brighton.

least 70 tons, so very powerful engines are needed. In the more level districts these are 4-6-4 and 4-8-4's, but when the trains have to go through the Rocky Mountains, then 2-10-4's of almost 350 tons are used.

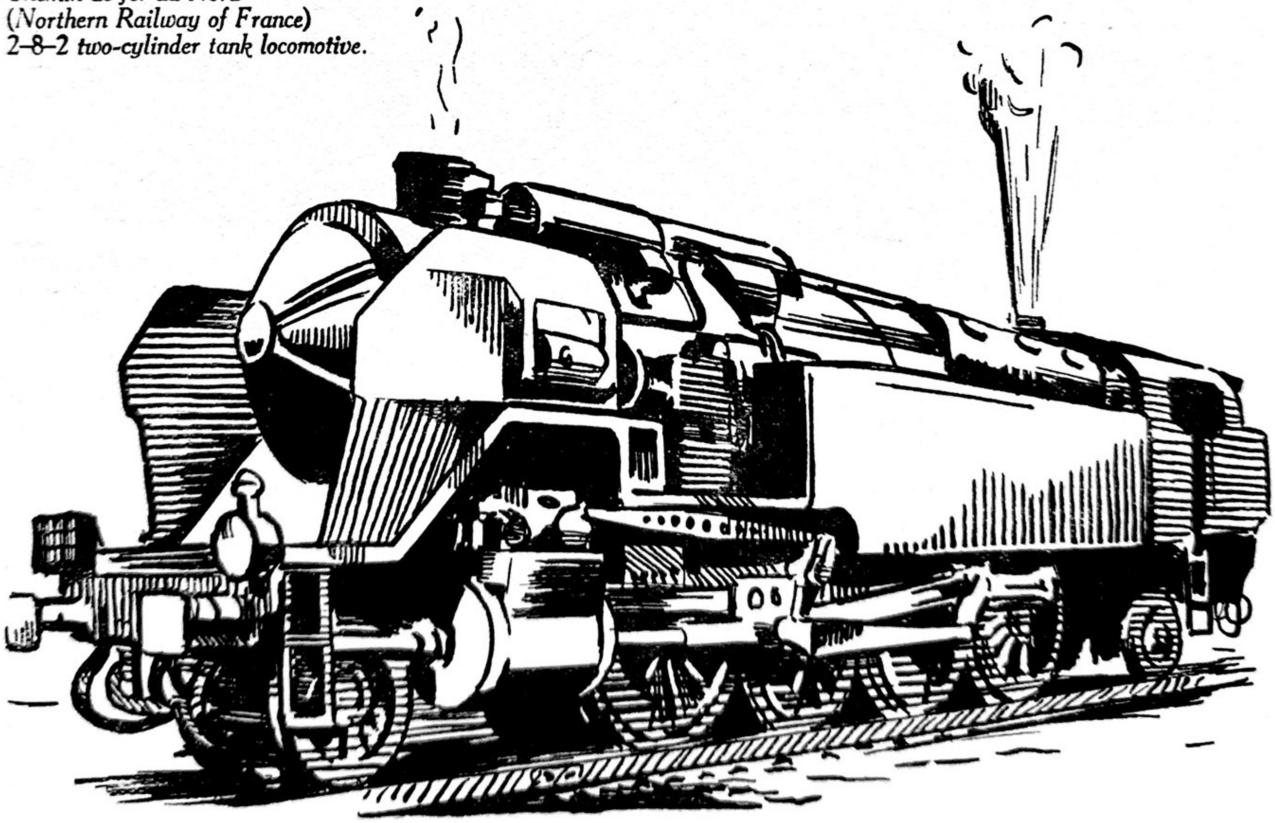
"There is some good speed seen in Canada, too, the 'Royal York' of the C.P.R. having to cover 124 miles from Smith's Falls to Montreal in 108 minutes, an average speed of 69 m.p.h.

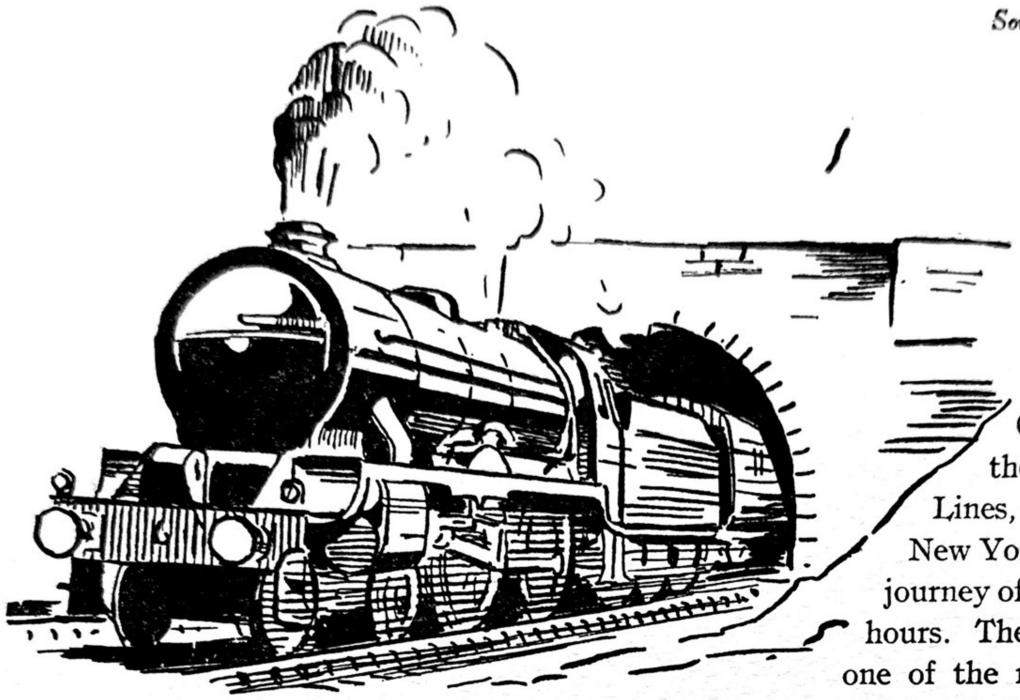
Southern Railway. The "Southern Belle" Pullman, Britain's first passenger main-line electrification 55 miles from London to Worthing.

Argentine British Built 4–6–4–T.



Chemin de fer du Nord
(Northern Railway of France)
2–8–2 two-cylinder tank locomotive.



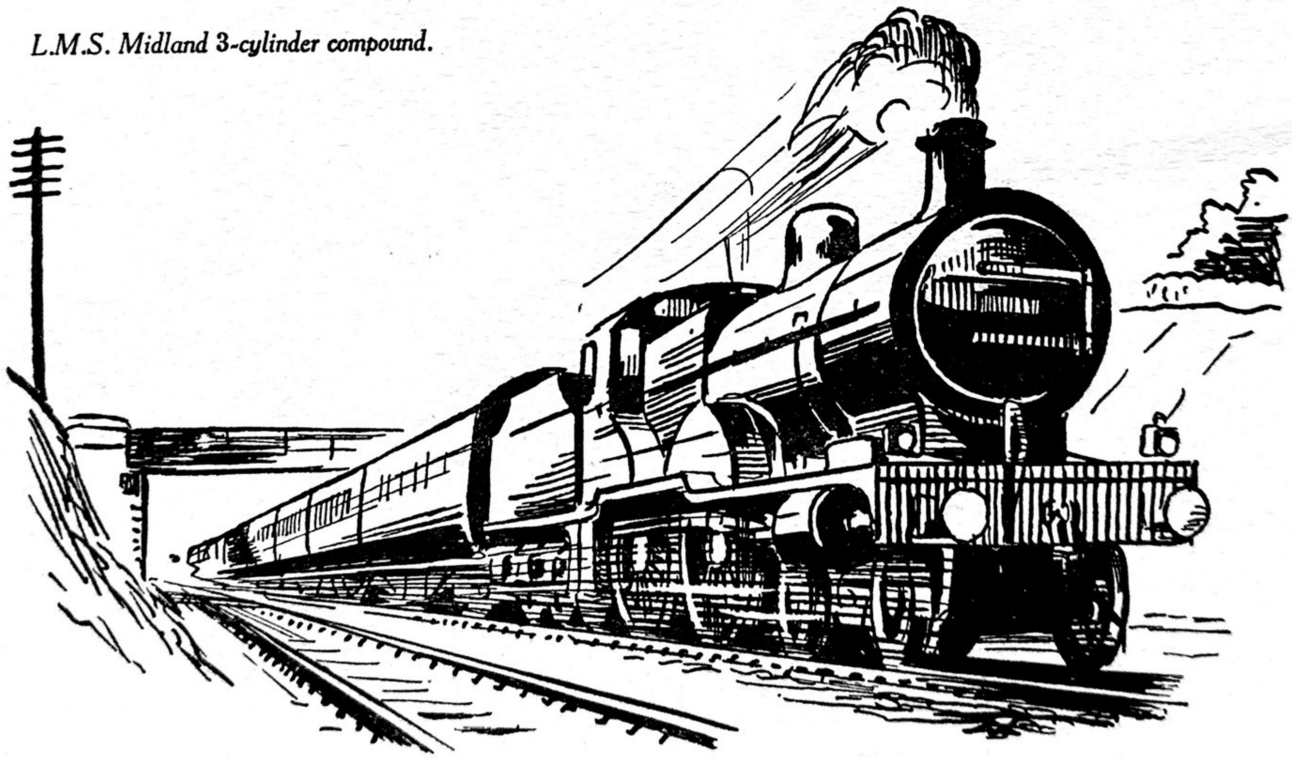


Southern Railway "Schools" class most powerful 4-4-0 type in Britain.

"The most famous train in the United States is the 'Twentieth Century Limited' of the New York Central Lines, which runs between New York and Chicago, the journey of 961 miles taking 18 hours. The engines are 4-6-4's, one of the most powerful six-coupled types in the world. The largest engines used are for freight haulage, such wheel arrangements as 2-10-2, 2-10-10-2, 2-12-4, 2-8-8-2, and even 2-8-8-8-4 being quite common. An engine of the 2-10-10-2 type, built for the Virginia Railroad in 1919, has hauled 111 wagons containing 107 tons each!

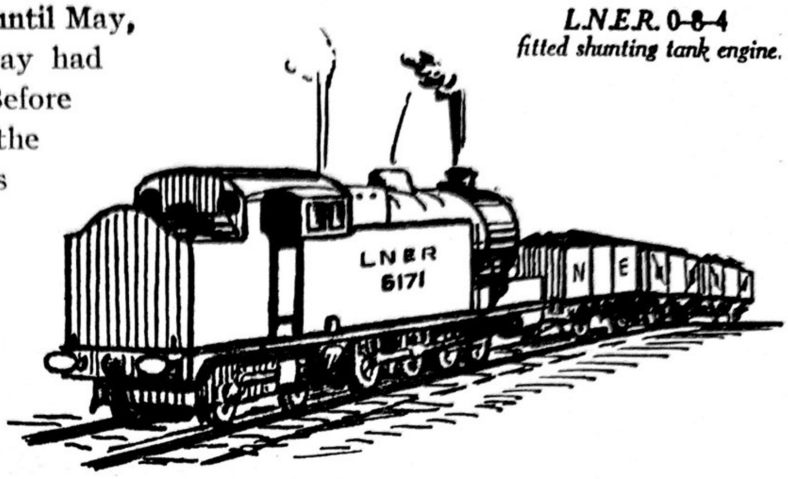
"In Great Britain the gauge, or distance, between the rails, is 4 feet 8½ inches, called

L.M.S. Midland 3-cylinder compound.



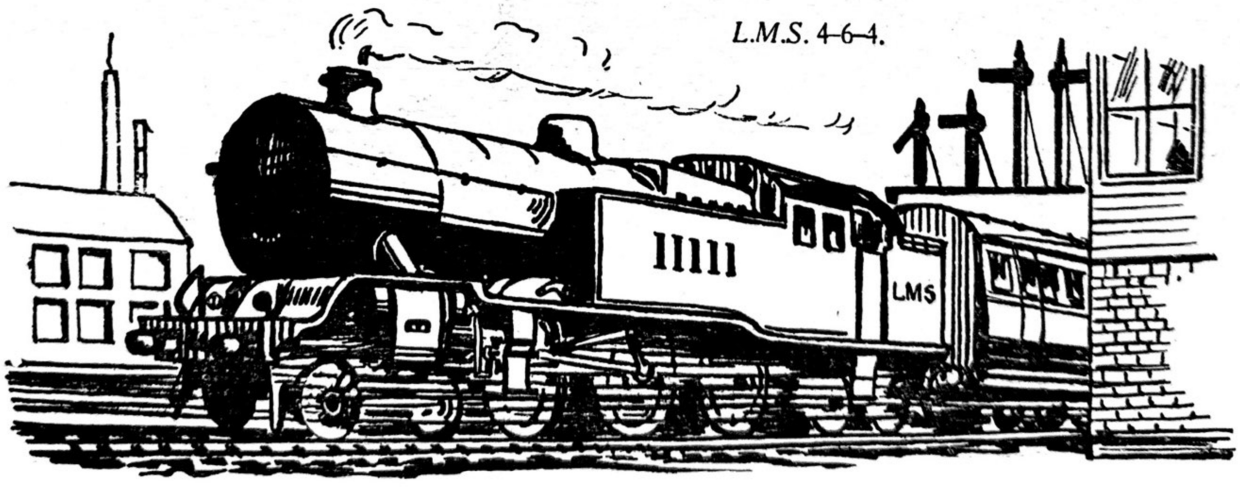
the ' standard ' gauge, although, until May, 1892, the Great Western Railway had used the broad gauge of 7 feet. Before the G.W.R. came into line with the rest of the big companies there was quite a ' battle of the gauges '. In some countries narrow-gauge railways are used, the 3′ 6″ being the most popular. South Africa has this gauge and some very fine locomotives work over it. The strangest thing is, that although the narrow-gauge is used, the express engines are much larger than the biggest in Britain. South Africa's best known train is the ' Union Ltd.' running between Cape Town and Johannesburg. One day there will be a railway from the Cape to Cairo, but 1,500 miles of track must first be made, and even then it will not be possible to travel on a through train, as Egypt uses the standard gauge. Other users of the 3′ 6″ gauge include New Zealand and Japan. In Australia the different states choose their own gauges without consulting each other, so, besides the standard gauge, there are other main lines of 3′ 6″ and 5′ 3″, causing much inconvenience in changing trains on long journeys. Is that enough for now ? "

L.N.E.R. 0-8-4
fitted shunting tank engine.



" Oh no, Dad, please go on ; tell me about railways in Europe ". " Righto ", his father continued. " Well, in France, where the gauge is half an inch wider than ours, some of the very best express train working in the world is performed, although at one time France rather lagged behind in the matter of speed and safety. The biggest French railway is the Paris, Lyons, and Mediterranean, ' P.L.M.' for short, and their most famous train is the ' Cote d'Azure ', which works between Paris and the Riviera. The P.L.M. uses 4-8-2 engines for their heaviest expresses. Other big French companies are the

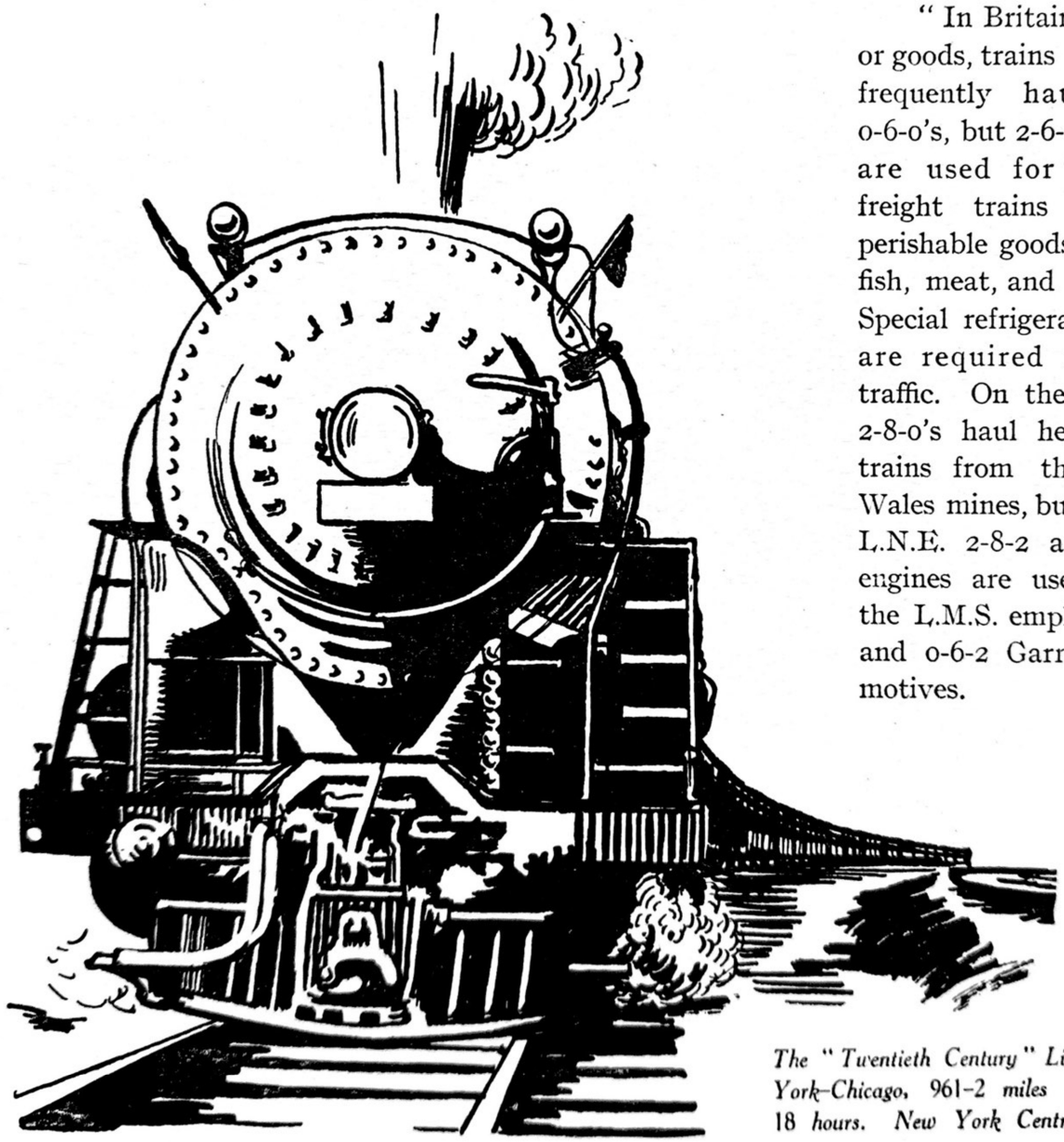
L.M.S. 4-6-4.



'Nord' (North), the 'Est' (East) and the 'Etat' (State). The last two also use 4-8-2's, but the Nord, or to give it its full title, 'Le Chemin de Fer du Nord', remains faithful to the smaller 'Pacific' type, and hers have to work terribly hard, with heavy trains and very fast timings. In France the maximum speed permitted is 120 kilometres an hour. 120 kilometres equal 75 miles.

"German railways work under the title of 'Deutsch Reichsbahn', which means 'German State Railways'. The commonest express engines used are Pacifics, but 2-6-0, 4-6-0, and 2-8-2 types also work express trains. For freight haulage some very big locomotives have been built, two eight-coupled, two ten-coupled types and one of the 2-12-0 wheel arrangement.

"In Britain, freight, or goods, trains are most frequently hauled by 0-6-0's, but 2-6-0 engines are used for express freight trains carrying perishable goods such as fish, meat, and bananas. Special refrigerated vans are required for this traffic. On the G.W.R. 2-8-0's haul heavy coal trains from the South Wales mines, but on the L.N.E. 2-8-2 and 0-8-0 engines are used, while the L.M.S. employ 2-6-0 and 0-6-2 Garrett locomotives.

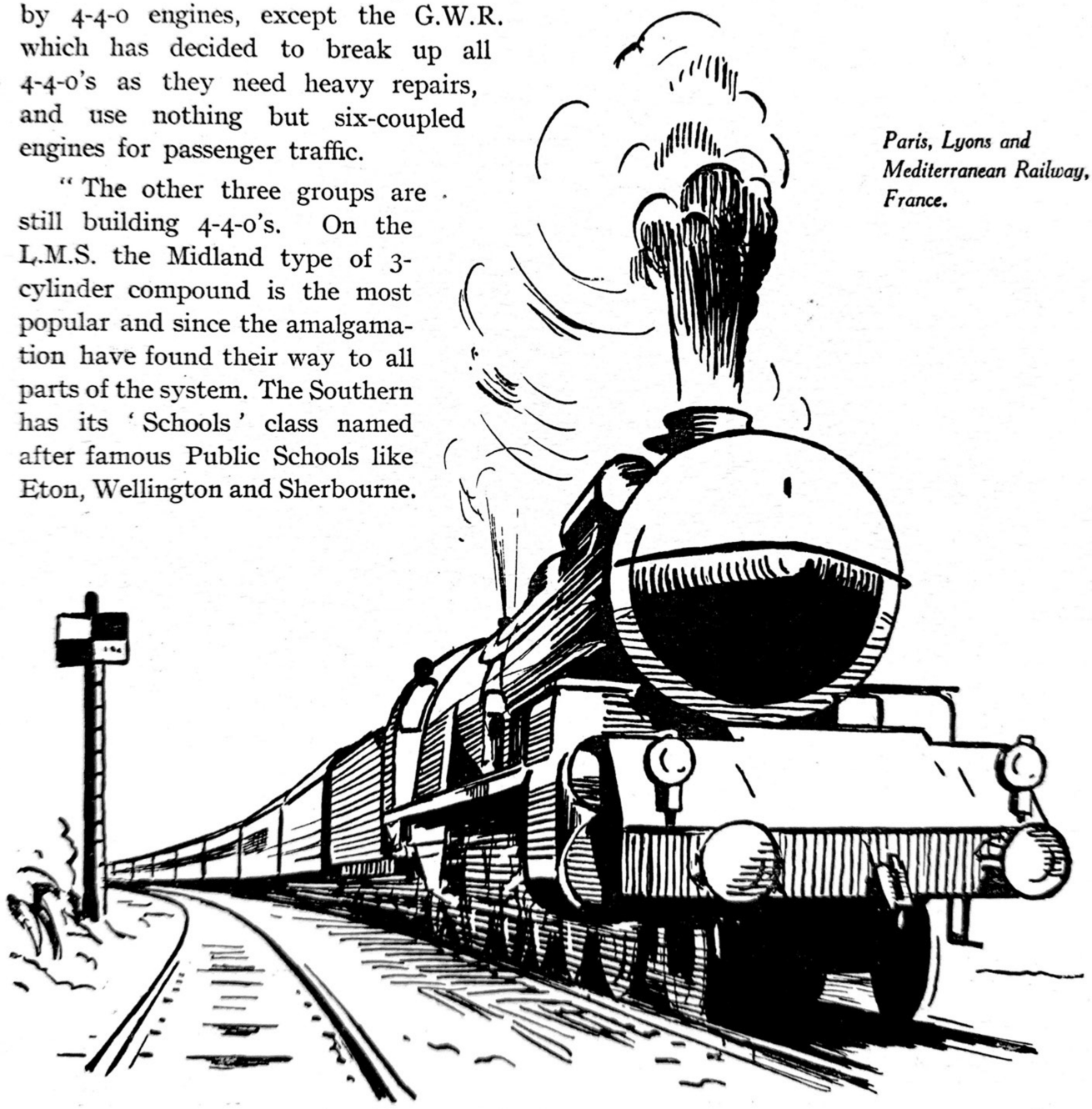


The "Twentieth Century" Limited, New York–Chicago, 961–2 miles covered in 18 hours. New York Central Lines.

" I expect you have seen on some goods trains, vans with a funny little sentry-box arrangement at the back. These are French or Belgian, and come to Britain via the train-ferry between Harwich on the L.N.E. and Zeebrugge in Belgium. Train-ferries save an immense amount of time in doing away with the necessity for unloading and reloading each van at the quay-side on either side of the Channel. Train-ferries are used in several places abroad.

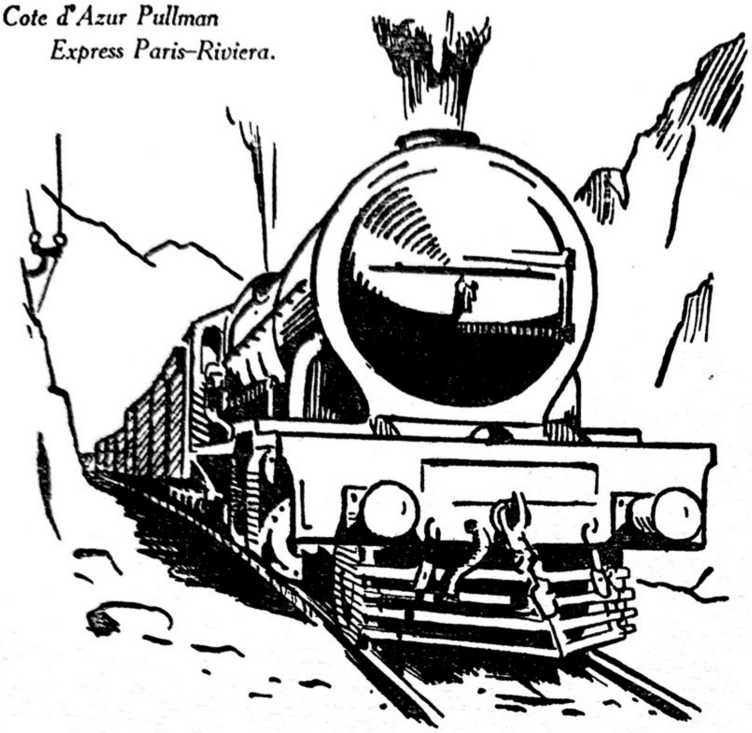
" Secondary, or lighter, express trains in the British Isles are almost always hauled by 4-4-0 engines, except the G.W.R. which has decided to break up all 4-4-0's as they need heavy repairs, and use nothing but six-coupled engines for passenger traffic.

" The other three groups are still building 4-4-0's. On the L.M.S. the Midland type of 3-cylinder compound is the most popular and since the amalgamation have found their way to all parts of the system. The Southern has its ' Schools ' class named after famous Public Schools like Eton, Wellington and Sherbourne.



Paris, Lyons and Mediterranean Railway, France.

Cote d'Azur Pullman
Express Paris–Riviera.



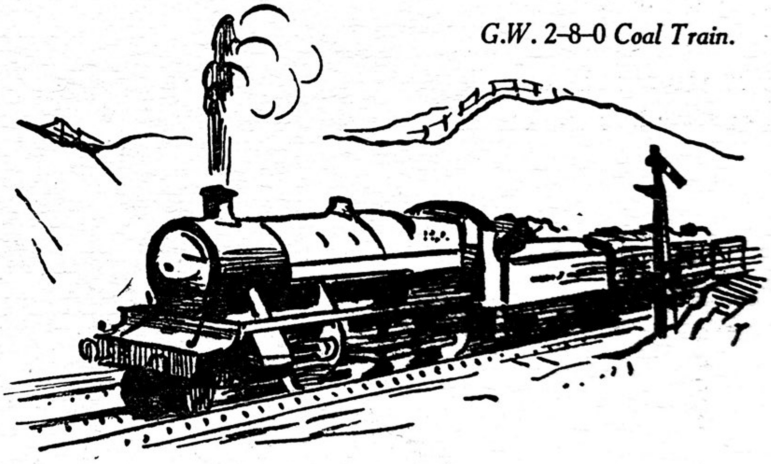
They are fine engines and very powerful for their weight. Then the L.N.E. have the 'Shire' and 'Hunt' class of 3-cylinder simple engines."

"Dad, what is a 'compound'?" asked Dick.

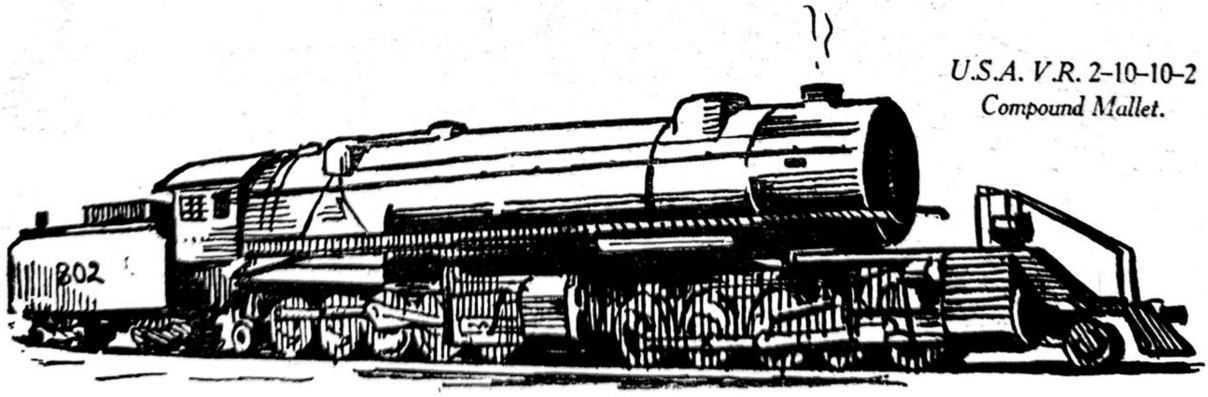
"A compound is an engine which makes the steam do its work twice, first going into one, or two, small cylinders, and exhausting into two of larger size", explained Mr. Wallace.

"Tank engines are also used quite a lot for short-distance trains, both passenger and freight, in this country and abroad. In France the new Nord 120-ton 2-8-2, is a fine engine capable of accelerating to 70 m.p.h. up stiff grades with trains of 480 tons. The biggest tank engine built in Britain is the 4-6-4 for the Argentine Railways, which is a lot

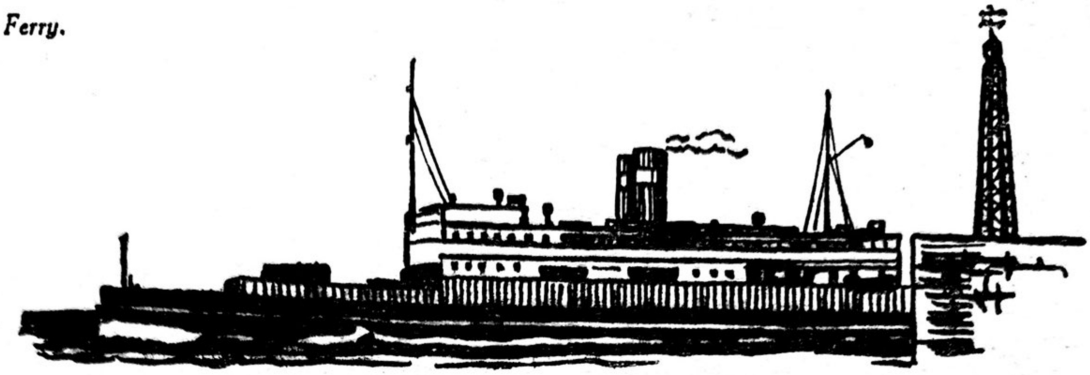
G.W. 2–8–0 Coal Train.



U.S.A. V.R. 2–10–10–2
Compound Mallet.



Danish Train Ferry.

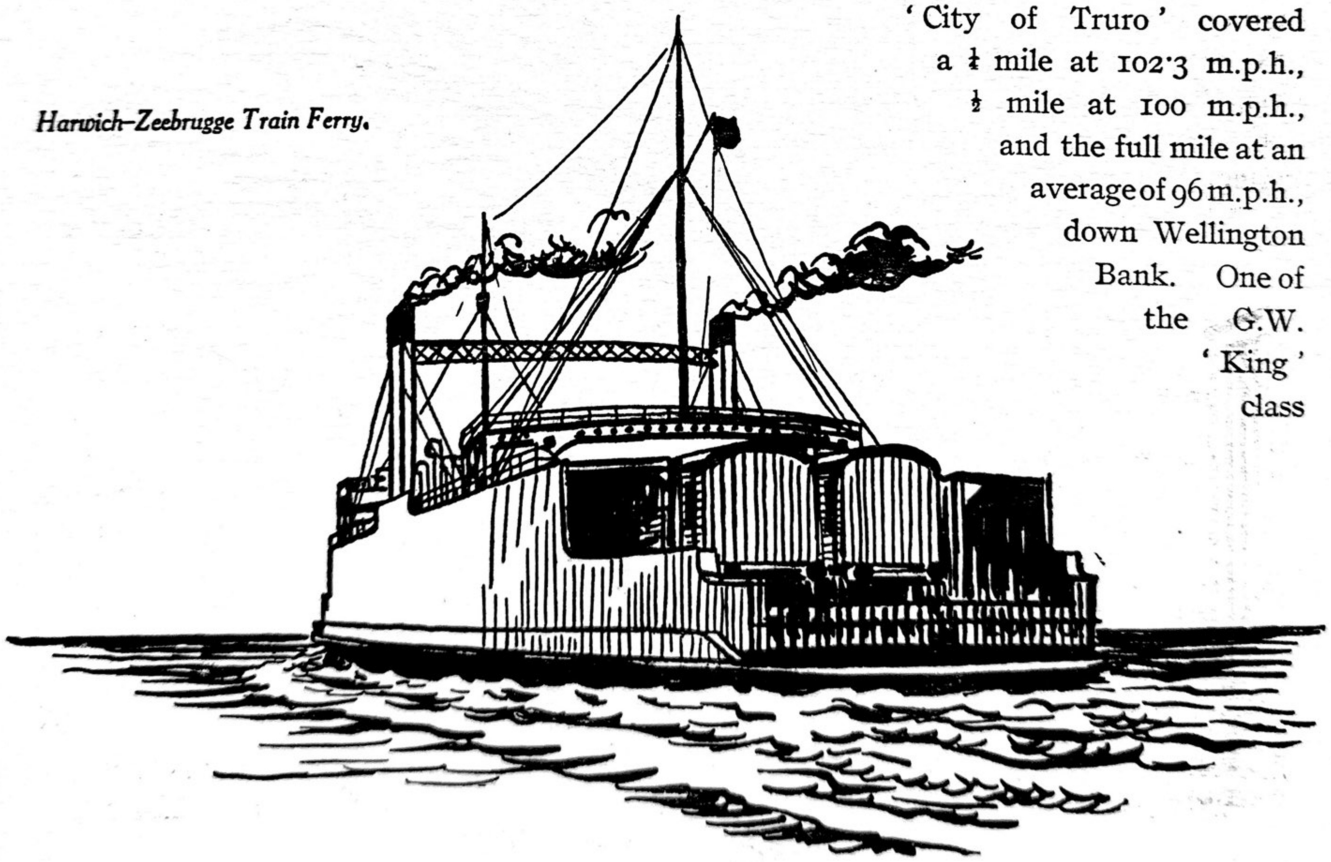


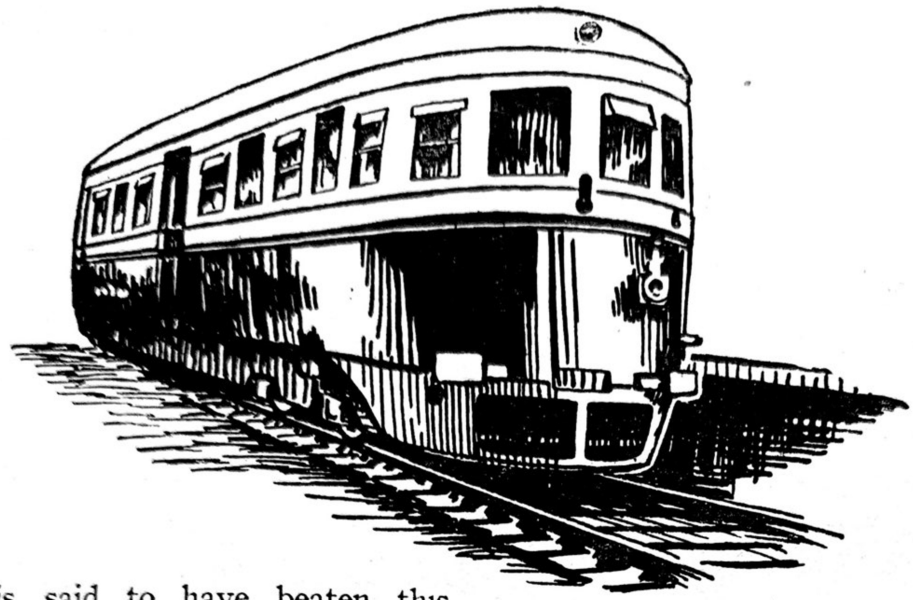
bigger than the L.M.S. 99-ton engines which are the largest passenger tanks in use in Britain. The L.N.E. have an 0-8-4 tank which has the trailing bogie wheels coupled together and driven by two small extra cylinders. This is called a booster and makes it much easier to start a heavy load. Boosters are also fitted to the trailing axle of the 2-8-2 engines and one or two others".

"Dad, what is the fastest speed an engine can do?" Dick suddenly burst in.

"Well, there are many claims of over 100 m.p.h., but there is only one definitely authenticated occasion on which a steam-engine has done so in ordinary railway working. This was on May 9th, 1904, when a G.W. Mail train of 148 tons hauled by the 4-4-0 'City of Truro' covered a ¼ mile at 102·3 m.p.h., ½ mile at 100 m.p.h., and the full mile at an average of 96 m.p.h., down Wellington Bank. One of the G.W. 'King' class

Harwich–Zeebrugge Train Ferry.



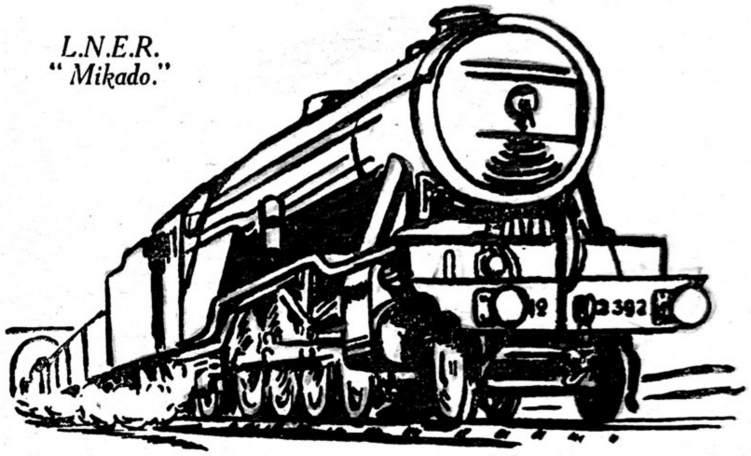


L.N.E.R.

Armstrong–Whitworth Diesel Electric RAILBUS 52 feet long, weight in working order with 95 B.H.P. Engine 17 tons 13½ cwt. 57–61 Passengers according to whether or not fitted with luggage compartment.

is said to have beaten this, but it has not been officially published. The ' City of Truro' is now preserved at the York Railway Museum. With electric engines a speed of 130·4 m.p.h. was reached in Germany in 1902, but this was a special trial on a line reserved for testing."

L.N.E.R.
" Mikado."



"I wish I could see all these engines", said Dick.

L.N.E.R.
2–8–0–0–8–2
Garrett banker.

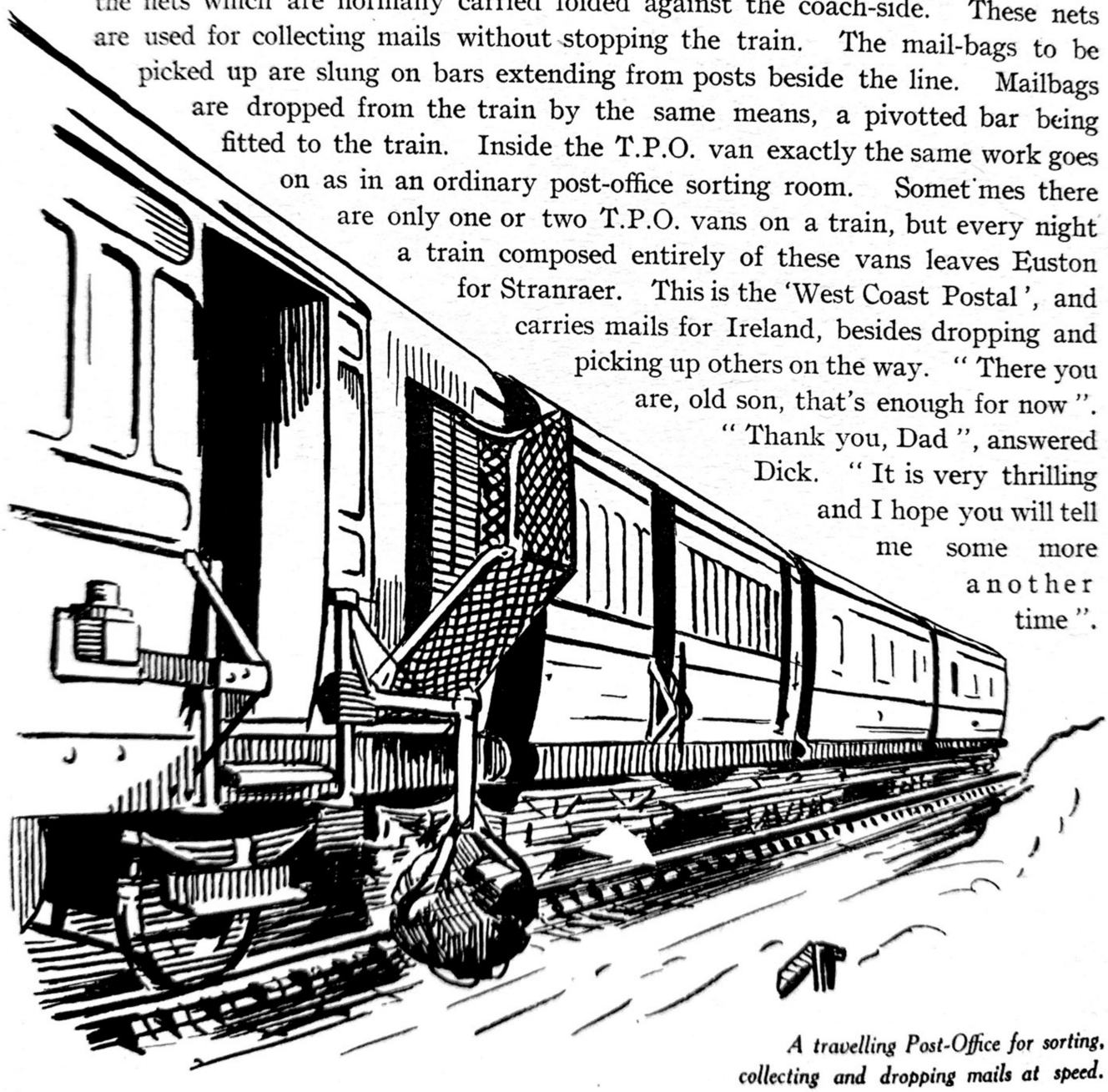
Then–"What happens when the rails are covered with snow?"

"Why, then snowploughs must be used. "They are special vans very like giant

ploughs, about 13 feet high and need one, and, when the fall is very heavy, two, engines to push them. Talking of snow reminds me of mountain railways which are built specially to carry tourists to the highest point to admire the view. There is only one—the Snowdon Railway—in Britain, but there are several in Switzerland, and one or two more in other parts of the world.

" On some British lines where traffic is very light, the companies are using rail-cars, a single vehicle with a small steam engine having a vertical boiler ; on the L.N.E. these rail-cars, which carry 59 passengers, are gaily painted and bear the names of famous stage-coaches.

" Now, Dick, there's just one thing more before I stop, and that is the travelling post-office or T.P.O. as it is called. The T.P.O. is very easy to distinguish by reason of the nets which are normally carried folded against the coach-side. These nets are used for collecting mails without stopping the train. The mail-bags to be picked up are slung on bars extending from posts beside the line. Mailbags are dropped from the train by the same means, a pivotted bar being fitted to the train. Inside the T.P.O. van exactly the same work goes on as in an ordinary post-office sorting room. Sometimes there are only one or two T.P.O. vans on a train, but every night a train composed entirely of these vans leaves Euston for Stranraer. This is the 'West Coast Postal', and carries mails for Ireland, besides dropping and picking up others on the way. " There you are, old son, that's enough for now ". " Thank you, Dad ", answered Dick. " It is very thrilling and I hope you will tell me some more another time ".



A travelling Post-Office for sorting, collecting and dropping mails at speed.